Amy - 100 pts for Sam - your answers are outstanding. you definitely are graduate material. The depth + breadth of your thinking is superior!

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1. Take a position on behaviorism or constructivism as a cognitive teaching structure in the elementary mathematics classroom. Defend your position by stating the favorable and unfavorable aspects of your decision.

Assumptions behind the 13 standards for K-4 curriculum as indicated by the 1989 NCTM report are:

- be conceptually oriented
- actively involve children in doing mathematics
- emphasize the development of children's mathematical thinking and reasoning abilities
- emphasize the application of mathematics
- include a broad range of content
- make appropriate and ongoing use of calculators and computers

Excellent way to start the supportive premise to the argument. Super job Amy!

These main ideas for teaching are obviously totally fulfilled in a constructivism learning climate. This cognitive teaching

approach developed its framework in the 1960's and 70's through the research findings of Piaget, Dienes, Lesh and Bruner. The constructive principles are based on a cognitive developmental thinking (Piaget's concrete, operational) rather than an analytical thinking basis. My experiences with teaching children have shown me how very true it is that children are concrete and operational. I've been disappointed about their CTBS scores, and I've come to the conclusion that they are not analytical. Choosing 1 answer out of 4 choices that are related in some way is extremely difficult for them because analysis is a more advanced thinking technique. Mathematics is a developmental process that students need to experience and apply to their world. Dienes says we need to create a learning laboratory with a large assortment

of materials and conceptual amplifiers such as computers (Reys & Post 1973) It is significant to me that these ideas for teaching evolved way before the new NCTM standards came about. The methods and strategies have been tried and researched I can support these methods because they have value for learning - instead of some strategies which evolve in order to promote an objective or goal (a behaviorist approach)

Excellent

Bruner believes the process of learning is as important as the content. He gives us a key model for depicting levels of thinking about a concept -

1) enactive - hands on / direct experience
2) iconic - visuals like pictures / films / drawings
3) symbolic - abstract symbols.

Children need interaction with Transferring knowledge from one mode to the other too (Lesh 1979). Textbooks or worksheets

alone could never provide children the these 3 elements effectively mixed. Text books can give iconic and symbolic resources.

Children need to build or construct their own concepts from within rather than those concepts imposed by some external force (Dienes 1960) We need mathematical thinkers for the future. If we simple train children to write the correct symbols down and call it math we are in fact crippling the future of our country. Creativity with mathematics in a learning climate that fosters group exploration will certainly bring rewards in the next century as the problems of this world compound and we need leaders to create solutions. In our busy fast paced society people who can

cope are those who can problem solve. Math has to make sense in the real world. Dienes suggest that we devise lessons around a theme, have children work in small groups, teacher facilitates (rather than lecture), students become more responsible for their own learning.

good

Learning is a personal affair and is constructed by the learner. Each person constructs knowledge in different ways so we need to share and talk about our experiences. Individual learning styles are appreciated in the construct method. I know if my elementary teachers would have used these methods of cognition I would have soared in math ability. However I memorized everything and never really understood our number

system until I taught small groups with manipulatives. I must have reconstructed reality to form solid math concepts (Piaget 1958)

The only unfavorable aspects of constructivism is that it takes time for a teacher to create a whole theme or unit and because information is constantly changing this would be ongoing development. However as more teachers publish ideas and activities it should help. Another problem is evaluation. Our methods of evaluation will need revision with more open ended types of feedback.

Excellent

Personally I get excited about a more global approach utilizing meaningful learning situations in the study of mathematics. Knowledge of math concepts is a developmental process which

② Select a Basic Operation and outline the steps of how a teacher would teach a child the operation structuring the lessons from concrete to the abstract levels. Include the manipulatives you would use, the supportive math curriculum and suggest some enhancement activities that might be used.

Addition -

Addition is a key operation which is utilized in multiplication and division algorithms. In the developmental process, it is the intial operation to introduce after pre-requisite concepts have been mastered:

Pre requisites are:

Numberness -

Classification - grouping a collection of objects on basis of common attributes

Seriation - put a collection of entities in order from smaller to larger

conservation - recognizing the numberness ("how many-ness") of a set

subitizing - to immediately perceive the numerosity of a set (no more than 4 elements) without counting

Counting - determining the numerosity of a set through association of words with the elements in the set. 1 to 1 correspondence

"The great majority of young children interpret arithmetic as counting" (Ginsburg, 1977 p.13)

Count lunch tickets, books, desks, etc

It is essential to learn all of the pre requisites with real life manipulatives - lots of concrete objects, blocks like unifex cubes, straws, cups, flannel board objects, peg boards. Another important readiness concept is Numeration and place value. Manipulatives such as cuisinaire rods and base 10 blocks are key.

I like to set up chip trading boards & abacus too. Students need to move into picture representations. Stamped images of base ten and the abacus continue to transfer understanding. Have students identify the digital numbers associated with the other modes (verbal and visual)

I have found that students have difficulty with operations if they don't understand numeration and place value, so I continue to reinforce these concepts continually. All operations need to include 1st concrete, real objects (enactive) 2nd representational (iconic) and 3rd abstract (symbolic)

Telling/reading a story about additive concepts is the best way to introduce. Then begin with manipulatives. Cuisinaire rods are sophisticated (both concrete and representative) however

highly successful in constructing a mindset for all operations. all over the world. Gradually with cuisinaire rods or unifex cubes I would lead students into number sentences 1st left handed type $a+b=\square$ then $a+\square=c$, $\square+b=c$ lastly $\square=a+b$, $c=\square+b$;

Most importantly I would incorporate problem solving daily so that the concepts are real life ones.

It's key for students to develop their knowledge constructs - 1st in concrete, then pictoral, and lastly symbolic abstract. Facts are best learned through these 3 ways for —